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TROPICAL FOREST NOTES

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RIO PIEDRAS, PUERTO RICO

AIR DRYING CONDITIONS FOR LUMBER IN THE SAN JUAN AREA, PUERTO RICO

No. 1

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Air drying of lumber requires the piling of lumber in a manner and location that permits outdoor air to move freely through the pile. The capacity of air to dry the lumber depends on its temperature, relative humidity, and its rate of movement through the pile. The lower the humidity and the higher the temperature, and the more air which moves through the pile the faster the lumber dries. The air that enters the pile is cooled as it takes moisture from the lumber, and its ability to take up further moisture is reduced. In cooling, the air becomes heavier and tends to flow downward through the pile.

The operator has little control over the temperature and relative humidity, but he can control air movement within certain limits by providing stickers of uniform thickness, and vertical flues in the piles. The stickers should be nominal-inch thickness, and about 1 1/2 inches wide. The use of the same moist lumber for stickers (self-stickering) is not recommended because wet spots may occur at points of contact and result in staining or other defects. The stickers should be about 2 feet apart for hardwoods, and they should be in good alignment one above the other so that the lumber will dry flat.

The foundations of the piles should be strong and level, and a clearance of 18 inches between the ground and the lower layer of boards is recommended. Weeds and debris around the pile should be removed. The drying yard should be level, and should not be obstructed by trees, buildings, or other objects.

Wood dries from the outside in; that is, the outer surfaces of a board dry first, and drying progresses inward. The wood finally attains a stable moisture content for any given combination of temperature and relative humidity. This is called the Equilibrium Moisture Content (EMC). Figure 1 shows the relationship of the Equilibrium Moisture Content to temperature and humidity in the San Juan area. The weather data, supplied by the U. S. Weather Bureau, are averages for several years. The temperature is the dry bulb measure in degrees Fahrenheit; relative humidity is the percent moisture in the air at that given temperature; EMC is the percentage moisture content that wood will attain at a given temperature and relative humidity.

A record of drying 4/4 cedro macho (*Carapa guianensis*) from October to December, 1956 is shown in Figure 2. The boards which were carefully piled in a shed with open sides, had an original moisture content of 43.6 percent, and they were dried to 20.4 percent in 57 days. Referring back to Figure 1, it is shown that this time is the slowest in the year for drying, and faster drying presumably occurs during March, April and May. Also, the relative humidity and the equilibrium conditions at that period in 1956 were higher than the average conditions shown in Figure 1.

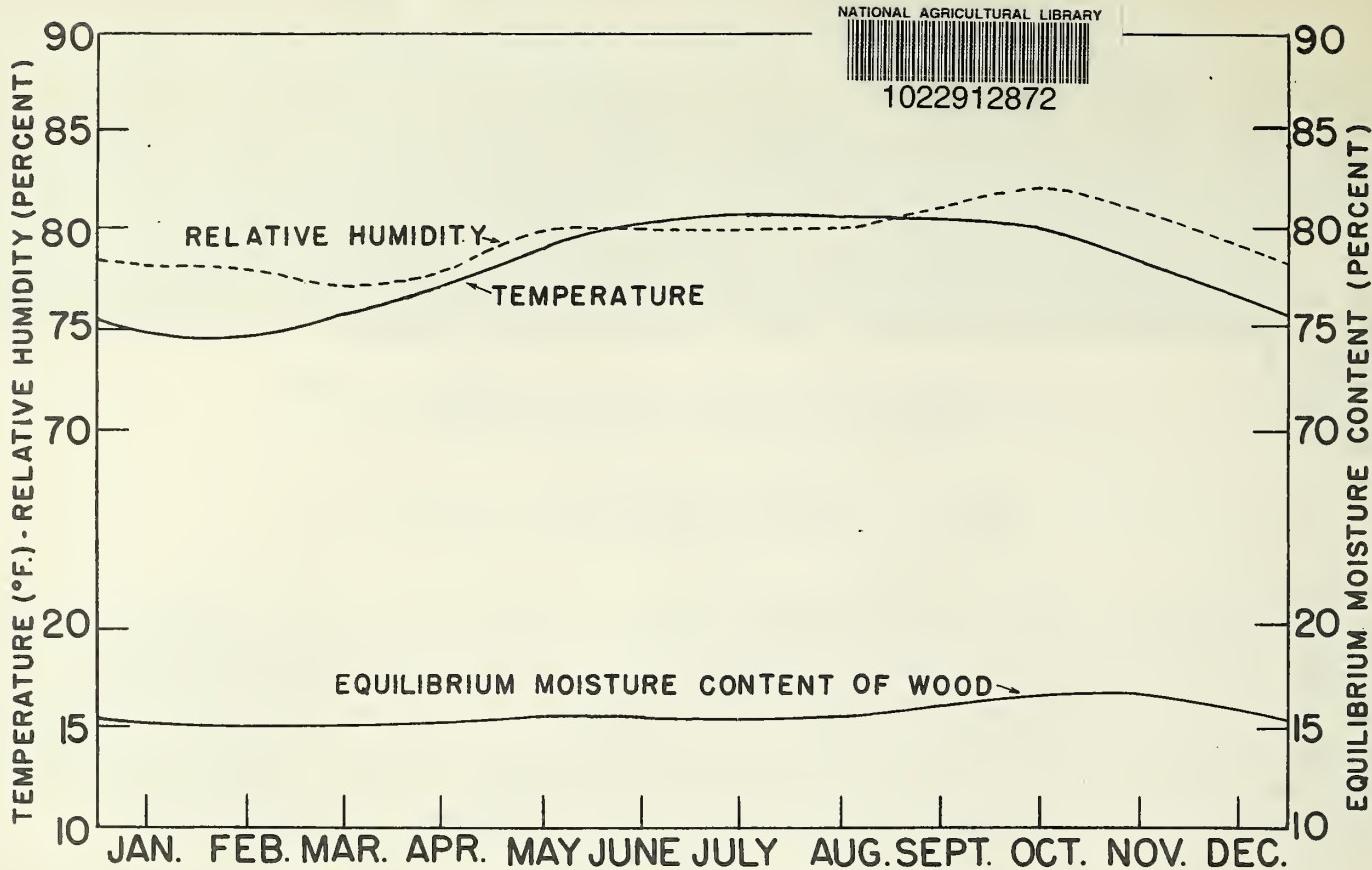


Figure I Relationships of temperature and humidity to equilibrium moisture content at San Juan, Puerto Rico.
(Data on temperature and humidity from U. S. Weather Bureau. Climatological Data, 1921-1950 period.)

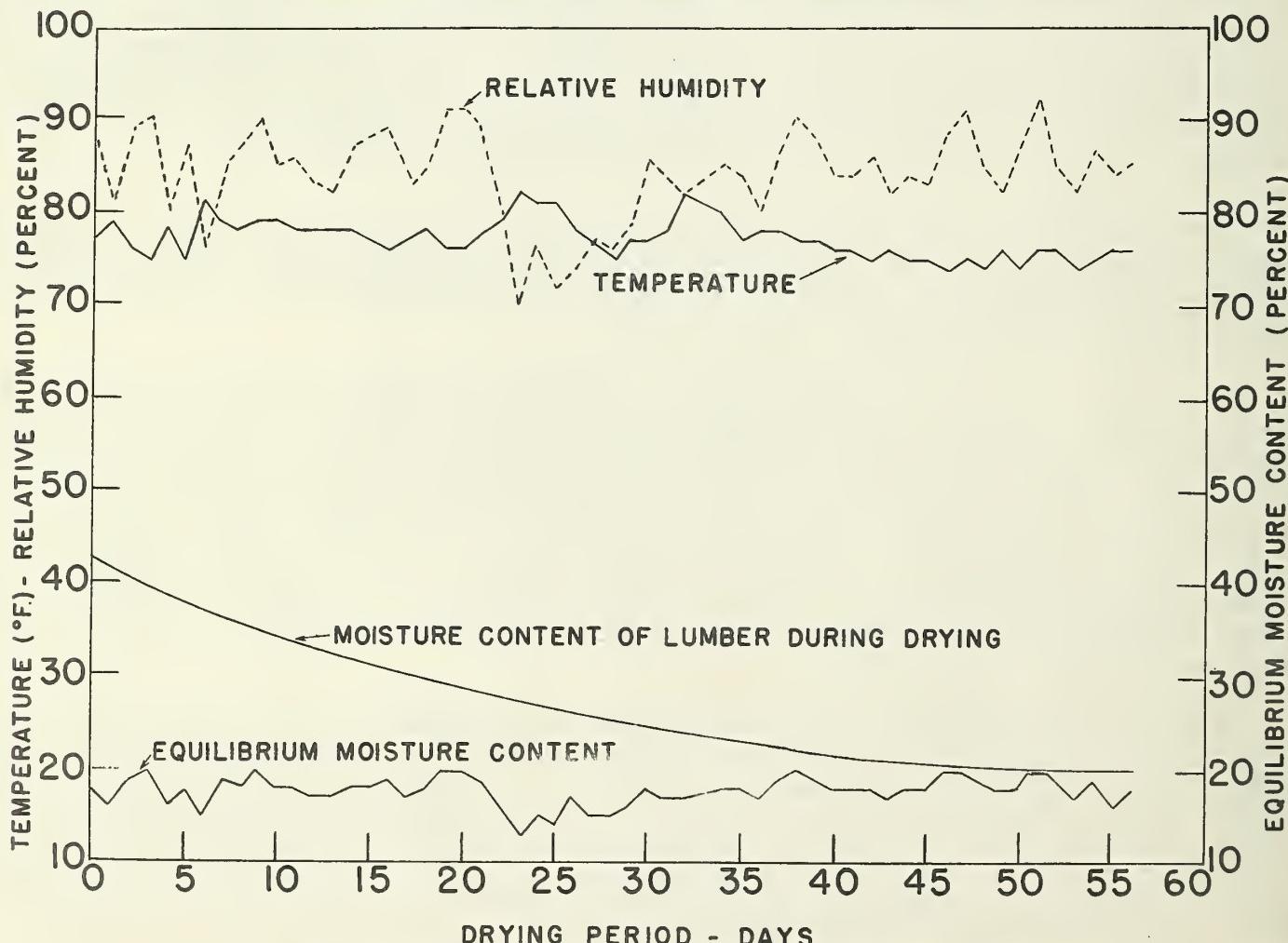


Figure II Daily temperature, relative humidities, equilibrium moisture content, and average moisture content of cedar macho (*Carapa guianensis*) lumber during drying from October 10 to December 4, 1956.